Lecture 24 Quiz

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Due: 30 April 2020

1. **Define what the index, the tag, and the valid bit do in a cache.**

   Direct-mapped cache has a rigid block placement strategy and this allows us to determine whether the block we're looking for is in the cache. The index is an address into the cache and it allows us to address a specific cache block. The tag allows us to compare blocks for cache hits or misses. Because this is a direct-mapped cache, the valid bit indicates that that's the only location that a specific block could be located. If the valid bit is asserted and the tags compare then we have a cache hit, in which case the processor then grabs the data that's there; if not asserted, there's a miss and the cache controller has to access the next level of the memory hierarchy.

2. **Why does an instruction cache typically have a lower miss rate?**

   Instruction cache lots of spatial and temporal locality compared to data access cache.

3. **Identify the three categories of cache misses.**

   Cache misses can be divided into compulsory (empty cache), capacity (cache size is too small), or conflict (cache is not fully associative).